REMARKS

Claims 1-34 are now presented for examination. Claims 1, 2, 7-15, 19, 30 and 31 have been amended to more particularly point out and distinctly claim the subject matter regarded as the invention. Claims 1 and 30 are independent. Favorable review is respectfully requested.

Claims 4-7 10-14, 16-18, 20-23, 25-29 and 31-34 were objected to under 37 C.F.R. § 1.75(c) as being in improper form. The claims have been carefully reviewed and revised where appropriate to ensure that correct dependence of the claims is recited. Claim 1, directed to a method for performing a supervised learning process, is independent; claims 2-29 depend directly or indirectly therefrom. Claim 30, directed to a method for producing a microarray for genotyping operations, is also independent; claims 31-34 are dependent therefrom, with claim 34 directed to the microarray and reciting all the features of method claim 30.

Claims 1-29 were rejected under 35 U.S.C. § 101 as reciting non-statutory subject matter. The Examiner stated that the invention was not limited to a substantial practical application, and in particular that optimizing a database (as recited in the claims) was an exercise only, without practical application. Independent claim 1 has been carefully reviewed and revised in light of the Examiner's comments. The claim has been amended to explicitly recite: (1) how the invention is employed, namely in a supervised learning process; (2) the application of the result, namely applying a selected prediction algorithm to a predetermined problem; and (3) where and how the method is implemented, namely with a computer and computer software forming an intelligent system. This revised claim language is clearly supported in the specification at paragraphs 83-90, particularly paragraph 90. It is respectfully submitted that amended claim 1, along with claims 2-29 dependent therefrom, recites statutory subject matter.

Claim 8 was rejected under 35 U.S.C. § 112, first paragraph. The Examiner stated that the phrase "structure of the training" rendered the claim non-enabling. The claim has been revised to recite --the structure of the training subset and the structure of the testing subset--, referring to subsets of the set of distributions of database records as recited in claim 1. Claim 8, as amended, is therefore believed to be in compliance with 35 U.S.C. § 112.

Claim 9 was rejected under 35 U.S.C. § 112, first paragraph. The Examiner stated that the recitation of numbers and selection of variables rendered the claim non-enabling; in particular, the Examiner stated that the claim introduced two independent domains of variables without a methodology for solving for those variables. The applicant wishes to point out that claim 8, from which claim 9 depends, recites that the database records include a certain number of known input variables and a certain number of known output variables. Claim 9 goes on to recite a population of prediction algorithms each having a data set in which not all of the variables are selected; some are left out (see specification, paragraph 105). This means that with respect to certain algorithms and data sets, some input data will not be required (see specification, paragraph 109). In other words, different algorithms will call for different input variables and thus different types of input data. Claim 9 recites generation of algorithms with different training and testing data sets, in which the selection of inputs varies accordingly, as opposed to requiring a methodology for solving for variables. It is believed that claim 9 as presented is in compliance with 35 U.S.C. § 112.

Claim 19 was rejected under 35 U.S.C. § 112, second paragraph. The Examiner stated that the phrase "one to a following status level defined for the genes" rendered the claim indefinite. The claim has been revised to recite that the status level of a gene is modified from one status level to another status level. It is believed that claim 19 as amended is in compliance with 35 U.S.C. § 112.

Claim 30 was rejected under 35 U.S.C. § 112, second paragraph. The Examiner stated that the terms "reduced number" and "microarray" rendered the claim indefinite. The claim has been revised to avoid the phrase "reduced number." The amended claim recites --a subset of the set of certain predetermined number--. With regard to the term "microarray," the applicant respectfully submits that this is a term known in the art, as evidenced by the discussion in paragraphs 135-148 of the specification. In particular, a cited reference "DNA microarrays in medical practice" includes the term in its title (paragraph 139). Accordingly, it is believed that claim 30 as amended is in compliance with 35 U.S.C. § 112.

Claim 2 was rejected under 35 U.S.C. § 112, second paragraph. The Examiner stated that the term "pseudo-random" rendered the claim indefinite, as this term was not clearly defined or an accepted term in the art. This statement is respectfully traversed. The term "pseudo-random" is well known in mathematics and statistics as referring to a distribution

constructed using a deterministic process (e.g. a mathematical algorithm, executed by a program running on a standard digital computer), as opposed to a distribution constructed using a classical non-deterministic process (e.g. a physical process such as rolling dice). Indeed, the distinction between "random" and "pseudo-random" has critical implications for some important applications such as cryptography (see Luby, Pseudorandomness and Cryptographic Applications, Princeton University Press, 1996). Formal definitions of a pseudo-random distribution may readily be found through wikipedia.org and planetmath.org. Accordingly, it is submitted that claim 2, as presented herein, is in compliance with 35 U.S.C. § 112.

Claim 15 was rejected under 35 U.S.C. § 112, second paragraph. The Examiner stated that the term "close to the average health value" rendered the claim indefinite. The claim has been revised to recite --greater than the average health value--. It therefore is believed that claim 15 as amended is in compliance with 35 U.S.C. § 112.

Claims 1, 2, 3, 8, 9, 19 and 24 were rejected under 35 U.S.C. § 102(e) as being anticipated by Lapointe et al. (U.S. Patent Application Publication 2003/0004906). The applicant respectfully submits that amended claim 1 is patentably distinct from the cited art, for the following reasons.

The present invention, as defined in claim 1, is directed to a method including the step of defining one or more distributions of database records onto respective training and testing subsets; using this defined set to train and test a first generation set of prediction algorithms; and feeding those prediction algorithms to an evolutionary algorithm which generates a set of second generation algorithms. In addition, claim 1 recites that a fitness score is assigned to each generated prediction algorithm.

Lapointe et al. is understood to disclose a method in which a set of data is partitioned into training and testing files (paragraph 91). Training of the neural networks is performed using the training partitions, and the networks are then evaluated using the testing partition (paragraph 141). Test set performance is maximized empirically, and test networks are trained with training parameters chosen empirically (paragraph 142).

Lapointe et al. therefore teaches a method of training by partitioning (see paragraph 92). Lapointe et al. does not mention generations of prediction algorithms (or generations of networks), and is not understood to disclose or suggest an evolutionary algorithm as recited in

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claim 1. In the passage cited by the Examiner (Lapointe et al. paragraph 468), a set of data (based on actual observations of patients) was constructed for use as a training example. Lapointe et al. briefly discusses the methodology used in the example, and states that some data points in the patient history data set were constructed because for some patients the actual data was missing. This procedure is understood to be a preliminary step of making the particular data set usable for the purpose of training a network. The process of supplying substitutes for missing data points is not understood to be relevant to generating prediction algorithms, or using an evolutionary algorithm to generate a set of second generation algorithms, as in the present invention.

Lapointe et al. is also not understood to disclose assigning a fitness score to an algorithm, as required by claim 1. Lapointe et al. teaches producing a 'consensus network' having an averaged performance estimate (paragraph 141). Lapointe et al. offers no other teaching regarding the performance (fitness, or any other quality) of a given individual network. Lapointe et al. therefore does not disclose or suggest an evolutionary algorithm which generates a set of one or more second generation prediction algorithms and assigns a fitness score to each; or using a fitness score as a criterion for a termination event in an evolutionary process.

Since Lapointe et al. does not disclose or suggest the features of claim 1 noted above, the invention defined in claim 1 is not anticipated by that reference.

Claim 15, indirectly dependent from claim 1, was rejected under 35 U.S.C. § 103(a) as being unpatentable over Lapointe et al. in view of Boden (U.S. Pat. No. 5,708,774). The applicant respectfully submits that amended claim 15 is patentable over the cited art, for the following reasons.

Claim 15 directly depends from claim 14 and incorporates all of the features of claim 14. Claim 15 thus characterizes the evolutionary algorithm as a genetic algorithm with certain evolutionary rules. One of these rules is that individuals having a fitness value lower or equal to the average health of the entire population are not excluded from the creation of new generations but are marked out and entered in a vulnerability list.

As noted above, Lapointe et al. does not suggest using an evolutionary algorithm (whether or not characterized as a genetic algorithm), and in particular does not suggest a fitness function used with an evolutionary algorithm. Furthermore, since it is concerned with

a 'consensus network' with an averaged performance estimate, Lapointe et al. does not suggest the desirability of assigning a fitness value to an algorithm, let alone using that fitness value as a criterion in an evolutionary algorithm. Lapointe et al. thus does not provide motivation for a combination with Boden regarding a fitness value. MPEP § 2143.01.

Boden is understood to disclose automated testing software including a "fitness function" for evaluating individual call sequences (col. 5, line 66, to col. 6, line 15). Boden teaches (col. 6, lines 8-15) that succeeding generations are chosen based on the fitness function, and states that "individuals of low fitness value may not be selected at all." Boden therefore does not teach or suggest that individuals having a fitness value lower or equal to the average health of the entire population are marked out and entered in a vulnerability list, as required by claim 15.

A combination of Lapointe et al. and Boden would at best yield an evaluation scheme in which a fitness function is executed, and individuals with a below-average fitness evaluation would not be selected for the next generation. Neither of the cited references, nor a combination thereof, suggests that individuals having a fitness value lower or equal to the average health of the entire population be not excluded from the creation of new generations but rather marked out and entered in a vulnerability list. Accordingly, claim 15 would not have been obvious from either of the references, or from a combination thereof.

Claim 30 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Lapointe et al. in view of Kwok et al. (U.S. Pat. No. 6,177,429). The applicant respectfully submits that amended claim 15 is patentable over the cited art, for the following reasons.

Claim 30 is directed to a method for producing a microarray for genotyping operations, including the steps of providing a database of experimentally determined data; dividing the database into a training and a testing dataset for training and testing a prediction algorithm; defining two or more different training datasets; training and testing the prediction algorithm with each of the different training sets and the associated testing set; calculating a fitness score or prediction accuracy of each algorithm; and providing an evolutionary algorithm. As discussed above, Lapointe et al. does not disclose or suggest calculating a fitness score or prediction accuracy, and does not provide an evolutionary algorithm as recited in claim 30. Kwok et al. is understood to disclose a method of detecting a nucleotide or sequence of nucleotides; Kwok et al. does not disclose or suggest defining datasets, training

and testing prediction algorithms, or providing an evolutionary algorithm. In particular, Kwok et al. does not suggest calculating a fitness score as recited in claim 30. Furthermore, Kwok et al. does not suggest repeatedly applying an evolutionary algorithm until a predetermined fitness score has been reached. It follows that Kwok et al. cannot remedy the above-noted defects of Lapointe et al. as a reference against the invention defined in claim 30. The features of claim 30 described just above would not have been obvious from either of the references, or from a combination of them.

The other claims in this application are dependent from one or the other of the independent claims discussed above and are believed to be patentable for the same reasons. Since each dependent claim is deemed to define an additional aspect of the invention, however, the consideration of each claim on its merits is respectfully requested.

In view of the foregoing amendments and remarks, favorable consideration and early passage to issue of the application are respectfully requested.

The Commissioner is hereby authorized to charge any fees which may be required for this Amendment, or credit any overpayment, to Deposit Account No. 50-1561 of Greenberg Traurig, LLP.

In the event that an extension of time is required to make this Amendment timely filed, the Commissioner is requested to grant a petition for that extension of time required to make the Amendment timely, and is hereby authorized to charge any fee for such an extension of time, or credit any overpayment, to Deposit Account No. 50-1561 of Greenberg Traurig, LLP.

Respectfully submitted,

Gerard F. Diebner
Registration Number 31,345
Attorney for Applicant
Tel: (212) 801-2134
Fax: (212) 801-6400

GREENBERG TRAURIG, LLP
200 Park Avenue
New York, NY 10166
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